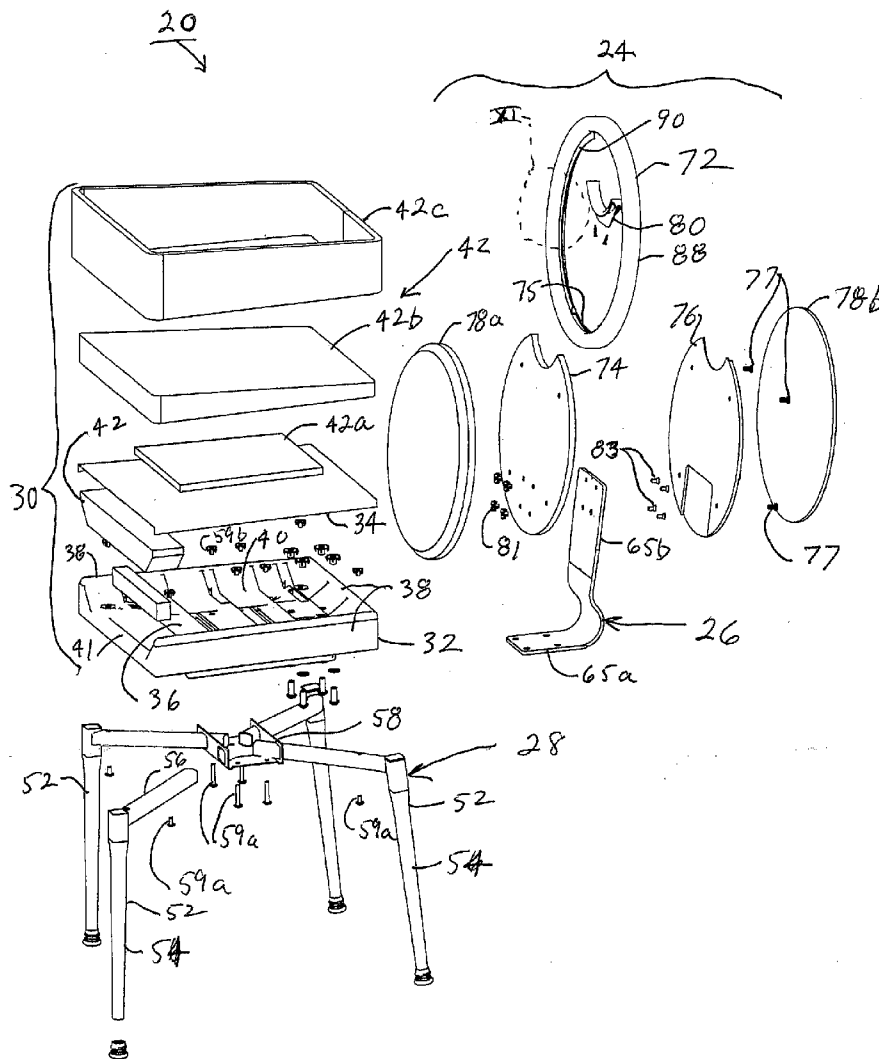




US 20110278889A1

(19) **United States**(12) **Patent Application Publication**
Sienkowski et al.(10) **Pub. No.: US 2011/0278889 A1**(43) **Pub. Date: Nov. 17, 2011**(54) **CHAIR****Publication Classification**(75) Inventors: **Bruce A. Sienkowski**, Ada, MI
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Marne, MI (US); **Daniel J.**
Gramza, Rockford, MI (US)(51) **Int. Cl.**
A47C 3/04 (2006.01)
A47C 3/00 (2006.01)
A47C 7/02 (2006.01)(52) **U.S. Cl.** **297/239**; 297/445.1; 297/297(57) **ABSTRACT**(73) Assignee: **Grand Rapids Chair Company**,
Grand Rapids, MI (US)(21) Appl. No.: **13/109,152**(22) Filed: **May 17, 2011****Related U.S. Application Data**(60) Provisional application No. 61/345,239, filed on May
17, 2010.

A chair includes a base, a backrest and a back brace supporting the backrest from the base. The base may include a seat assembly made up of a pan and a flexible support membrane over an upward opening cavity defined by the pan. The back brace may provide a flexible support for the generally planar member formed as a serpentine shape defined by a first curved portion opening toward said base and a second curved portion opening away from said base. The backrest may have an outer frame made from an extruded member having a generally tubular member and a fin coextruded with said generally tubular member to provide a fastening substrate for panels. The base may further include a leg assembly made up of a plurality of leg members and a joiner member joining horizontal portions of the leg members.



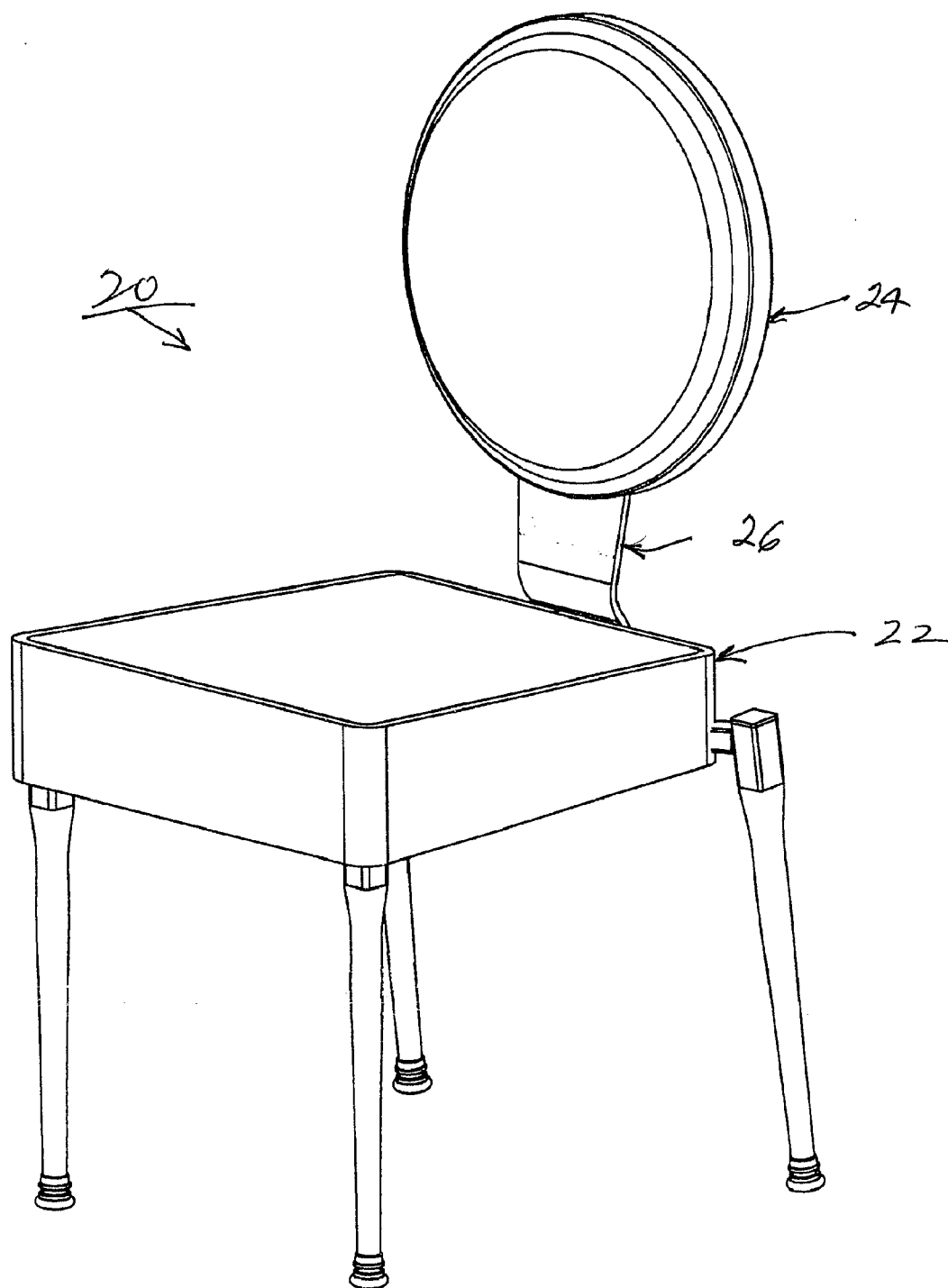


Fig 1

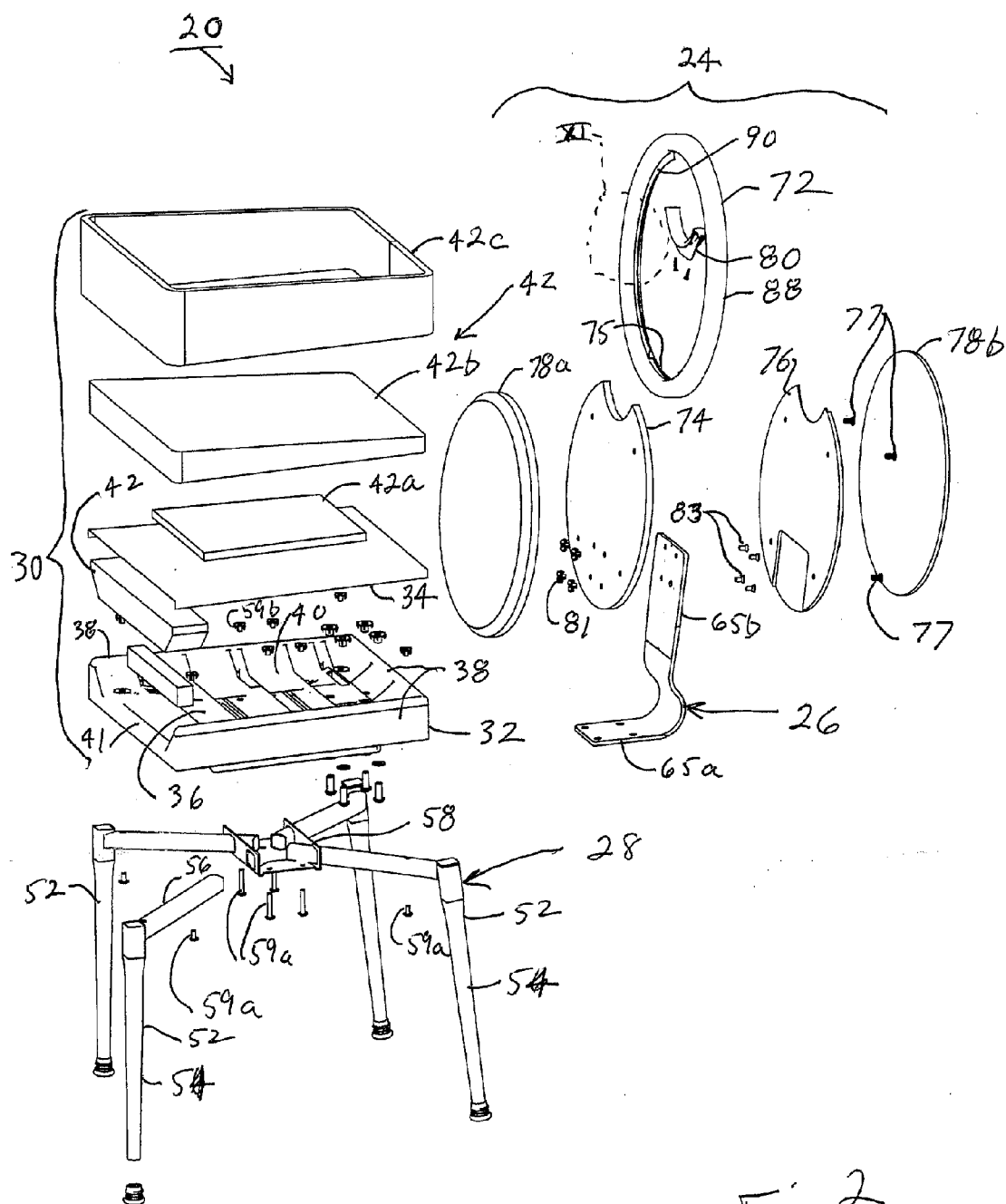


Fig 2

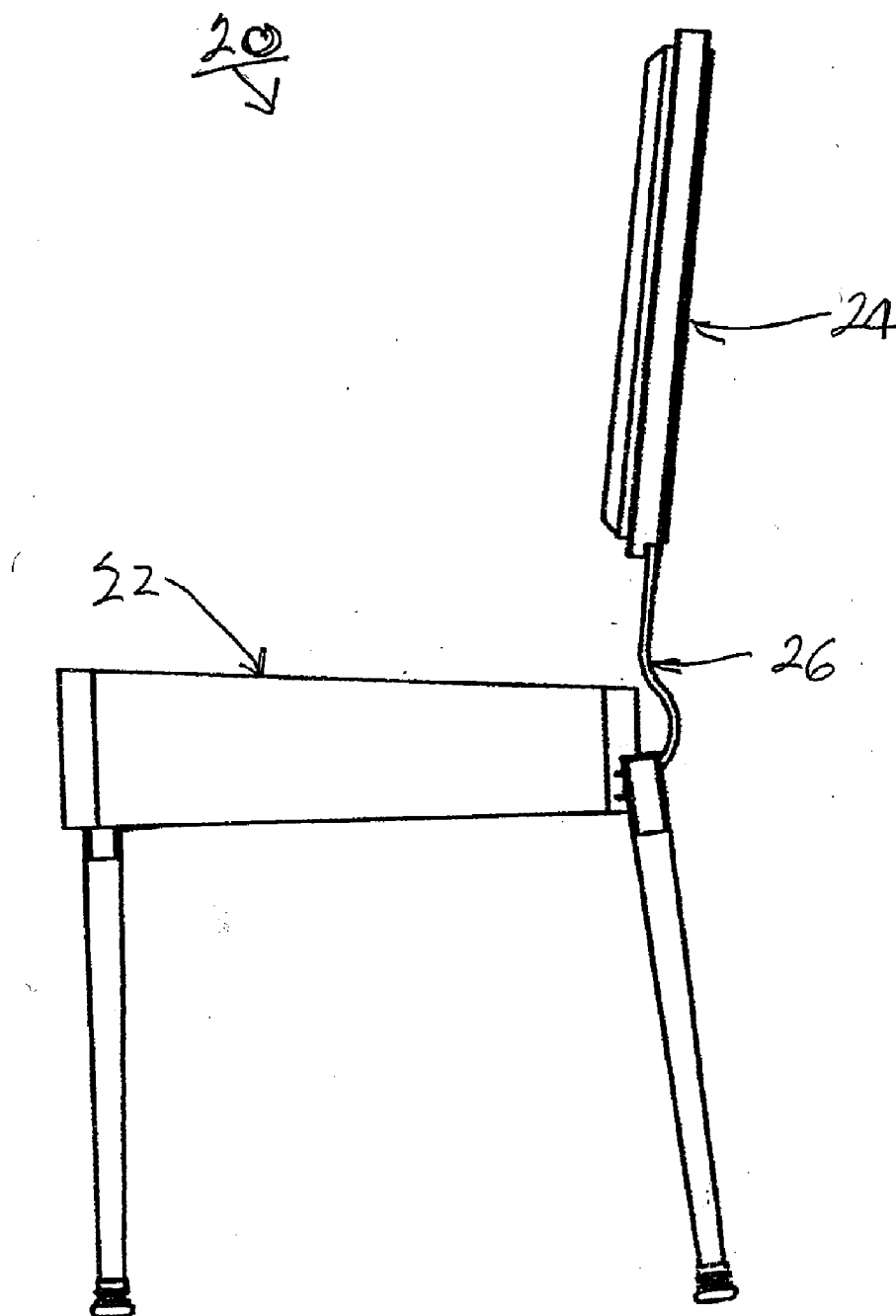


Fig 3

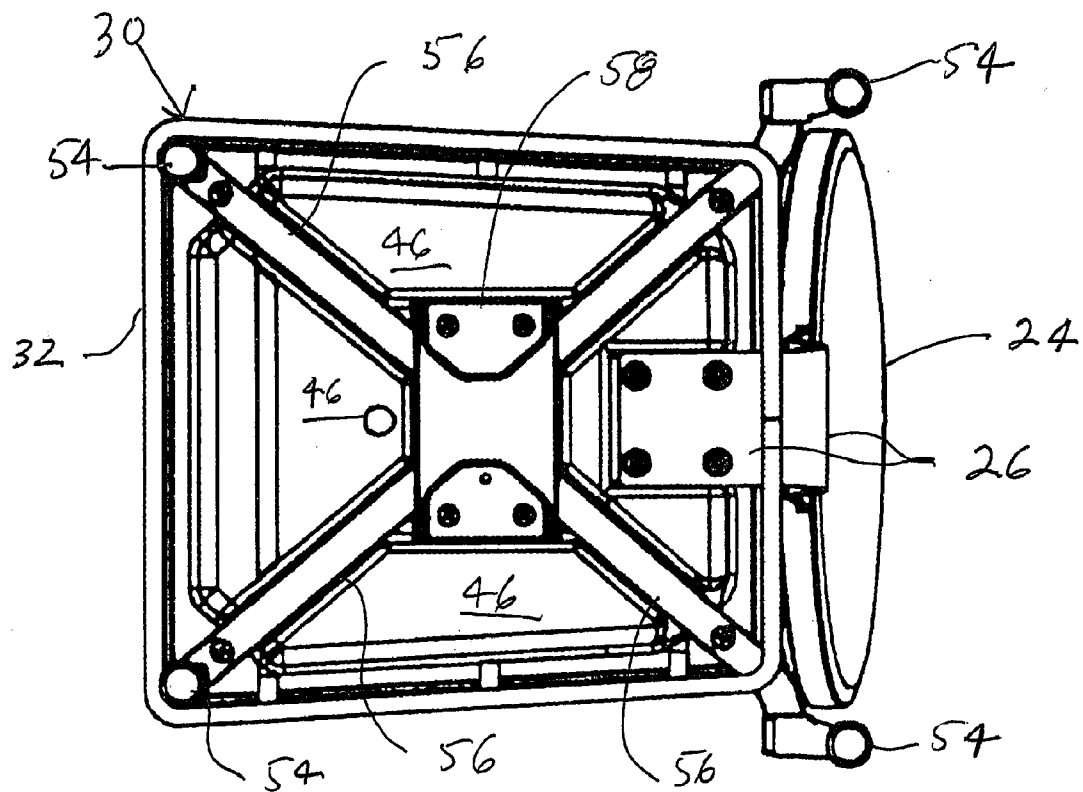


Fig 4

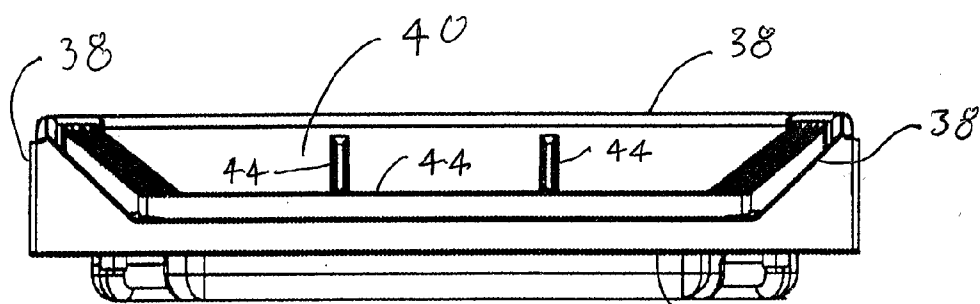


Fig 6

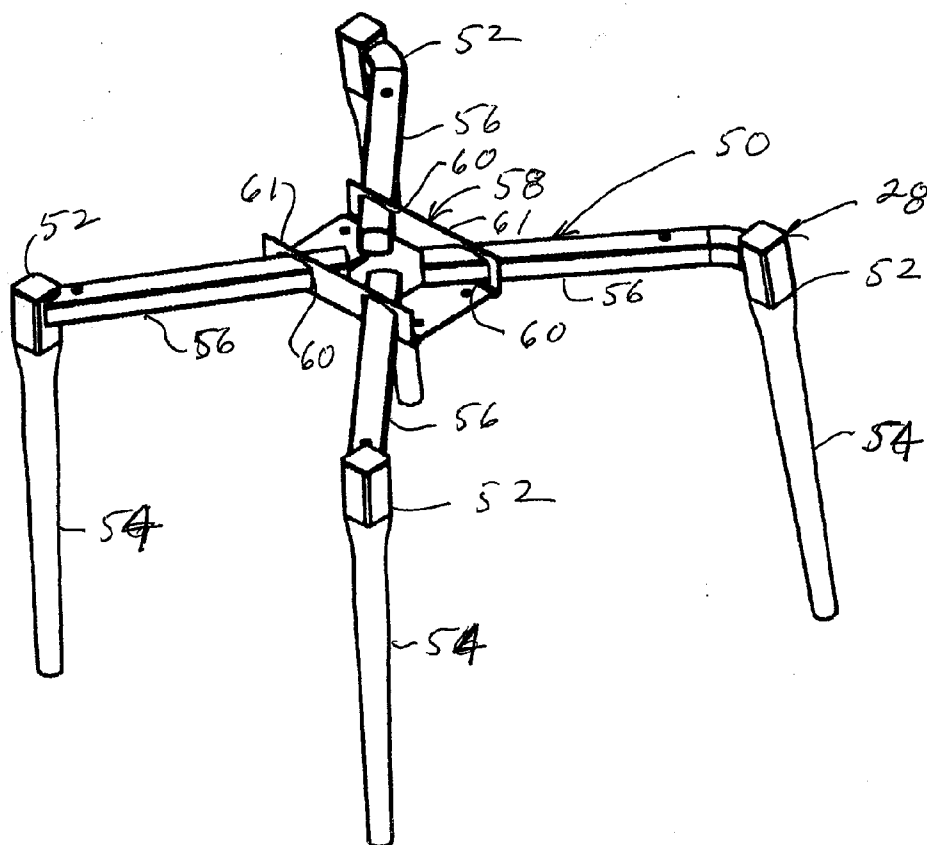


Fig 5

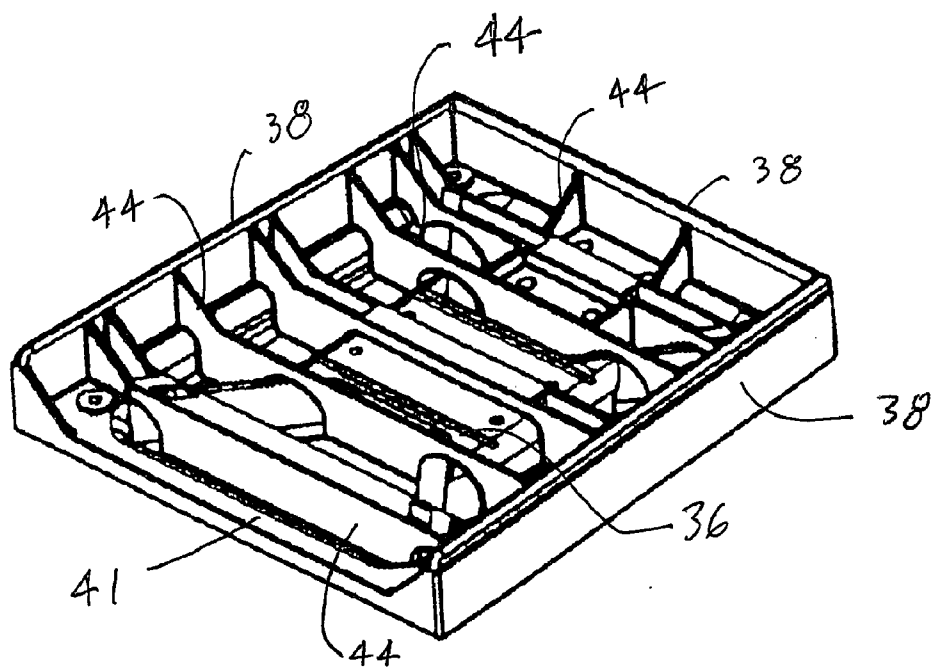


Fig 7

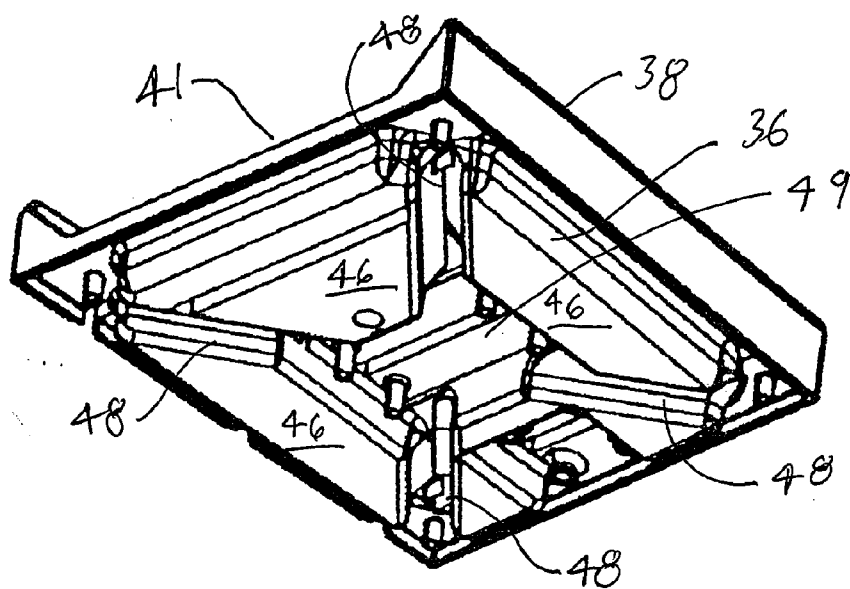


Fig 8

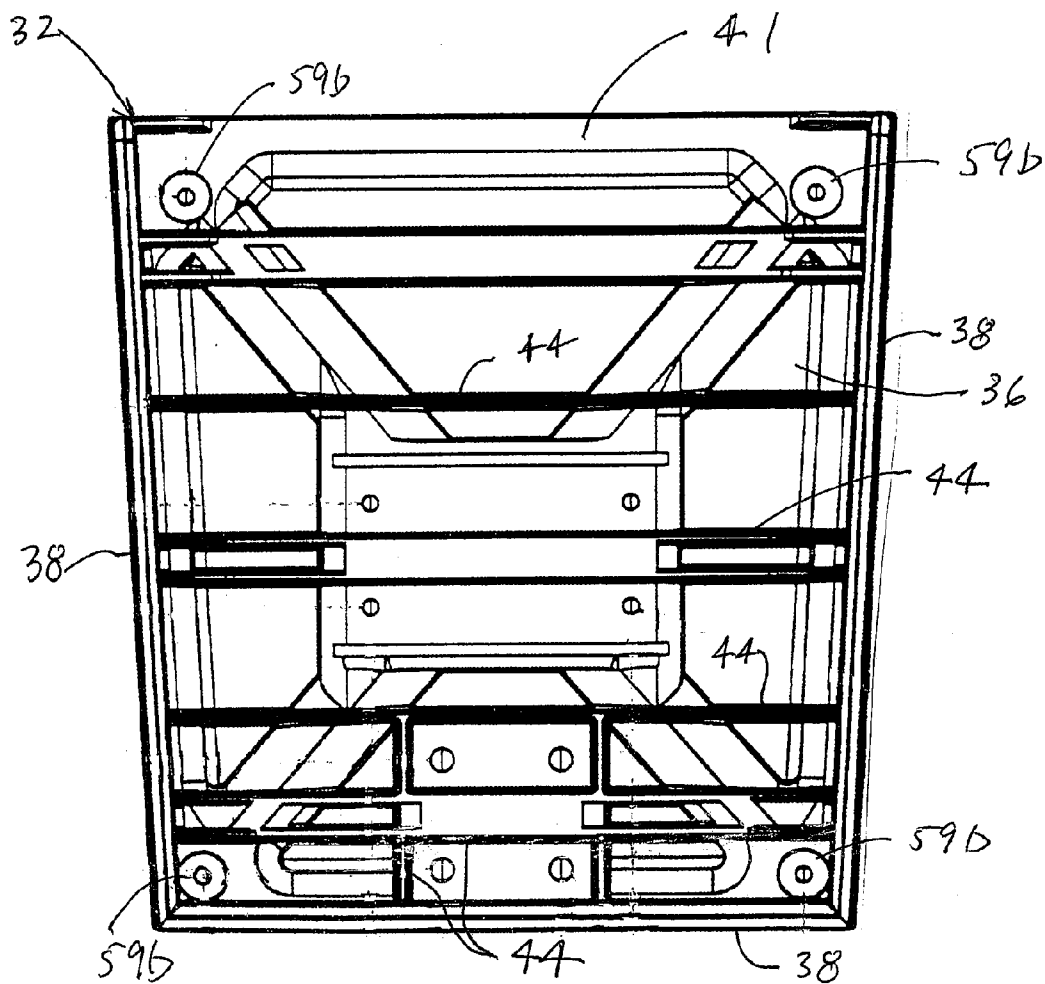


Fig 9

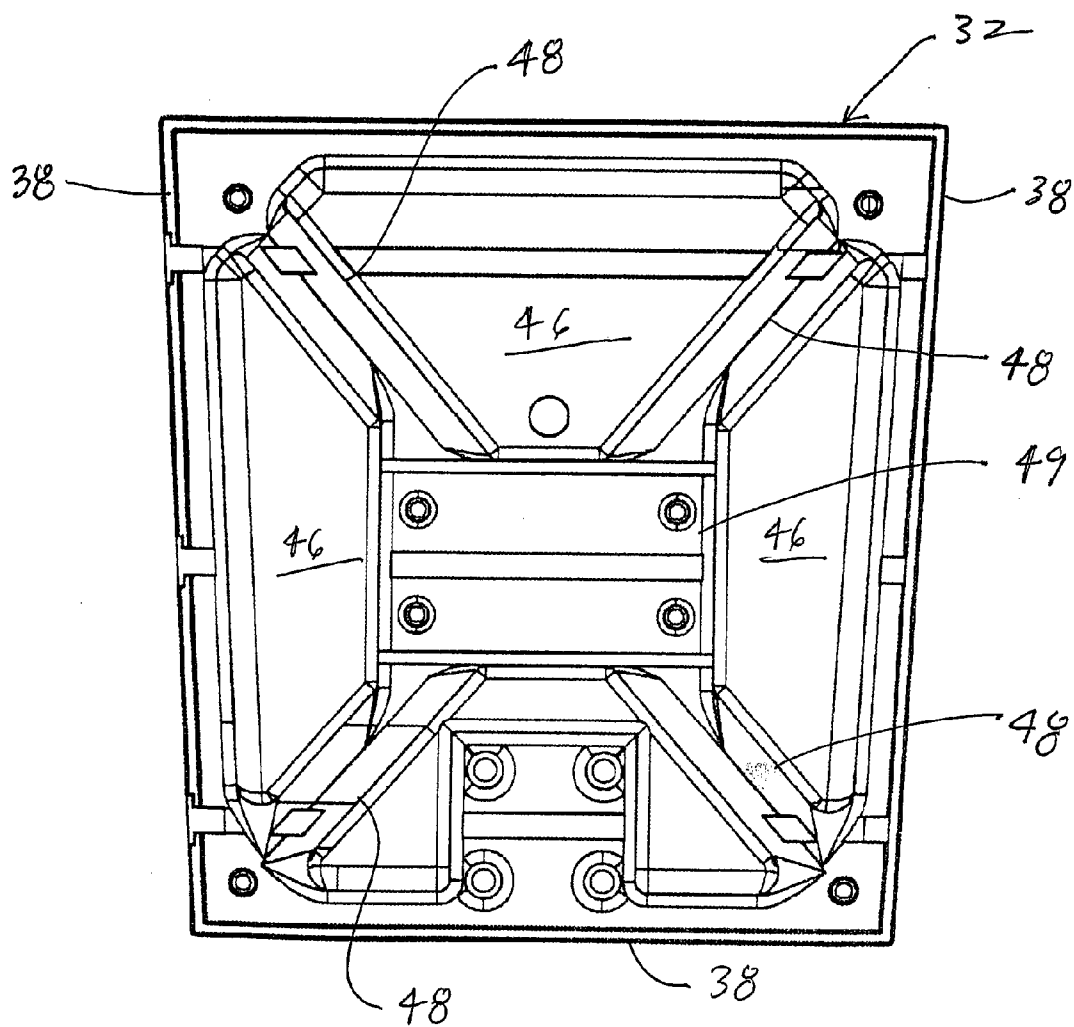
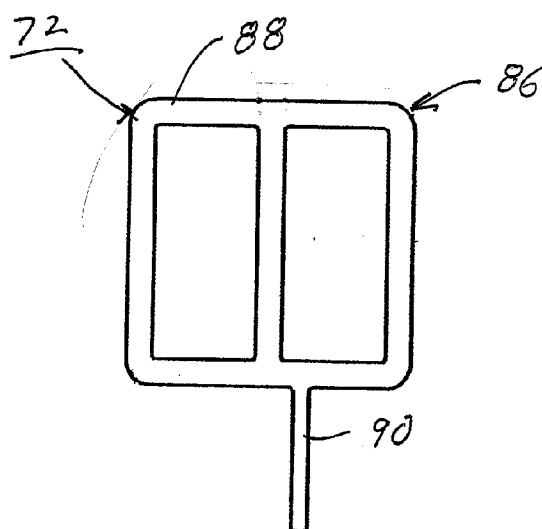
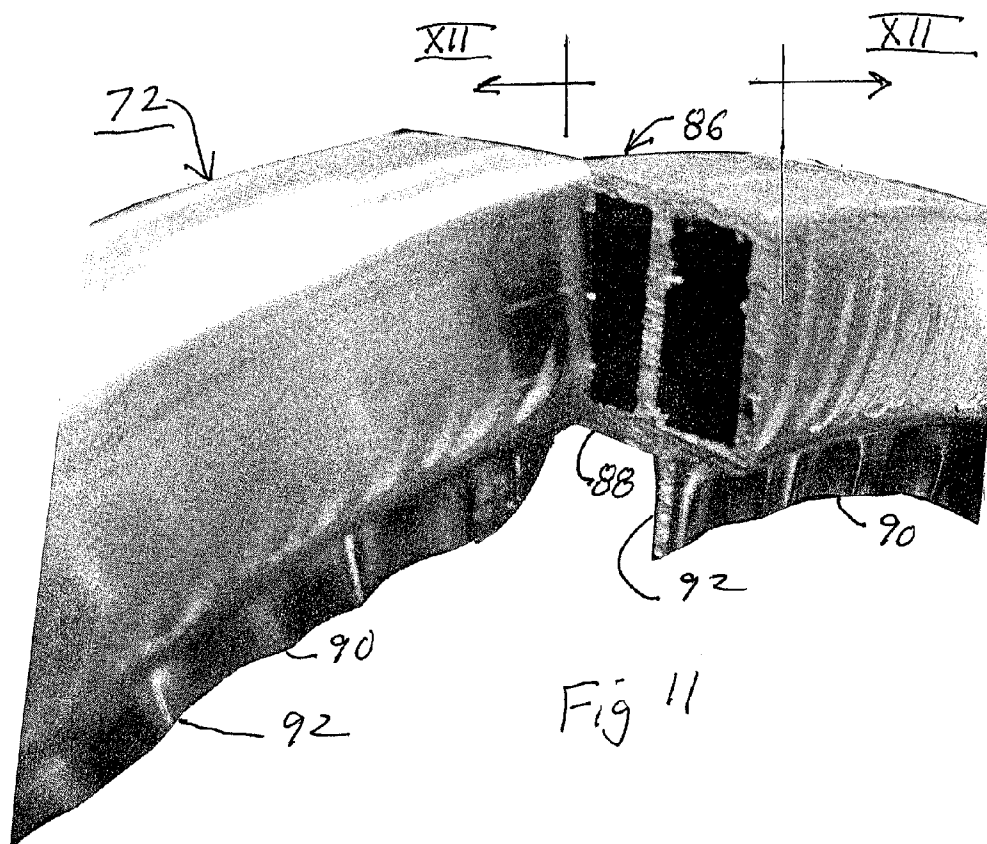
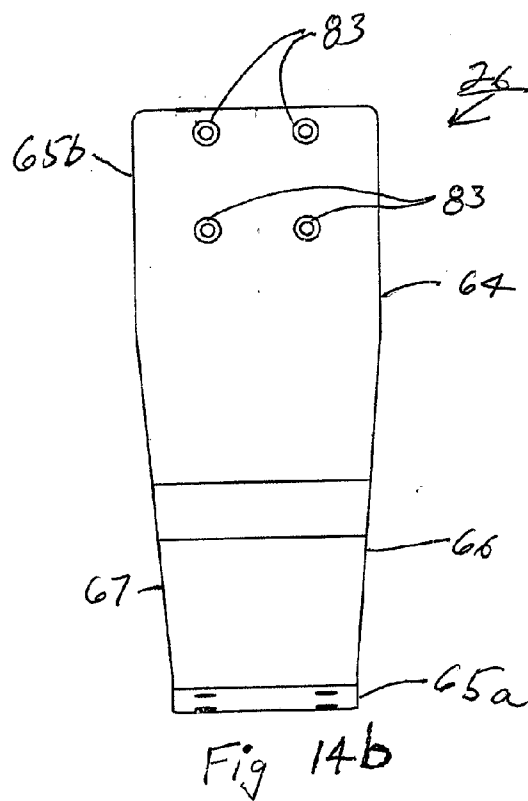
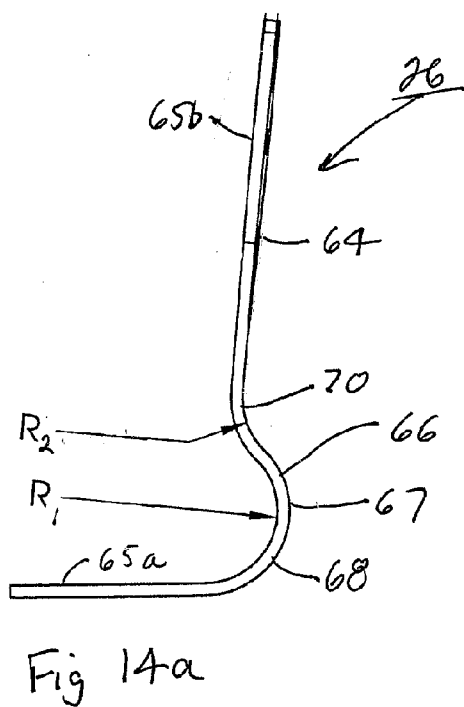
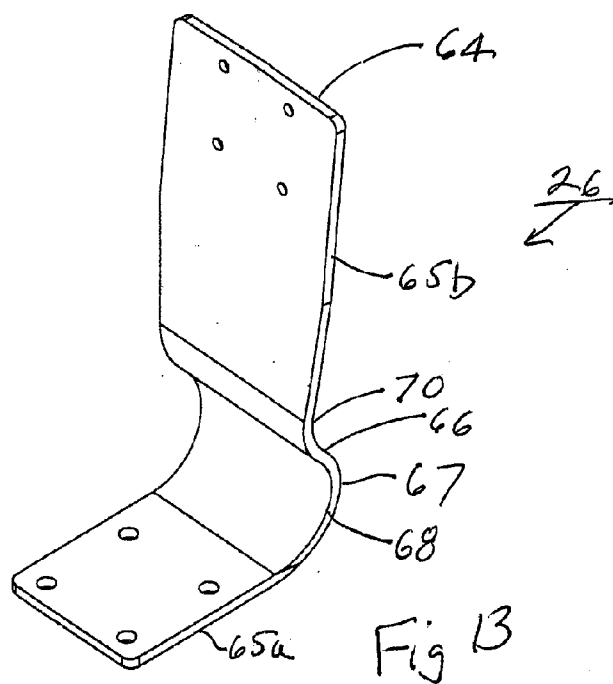


Fig 10





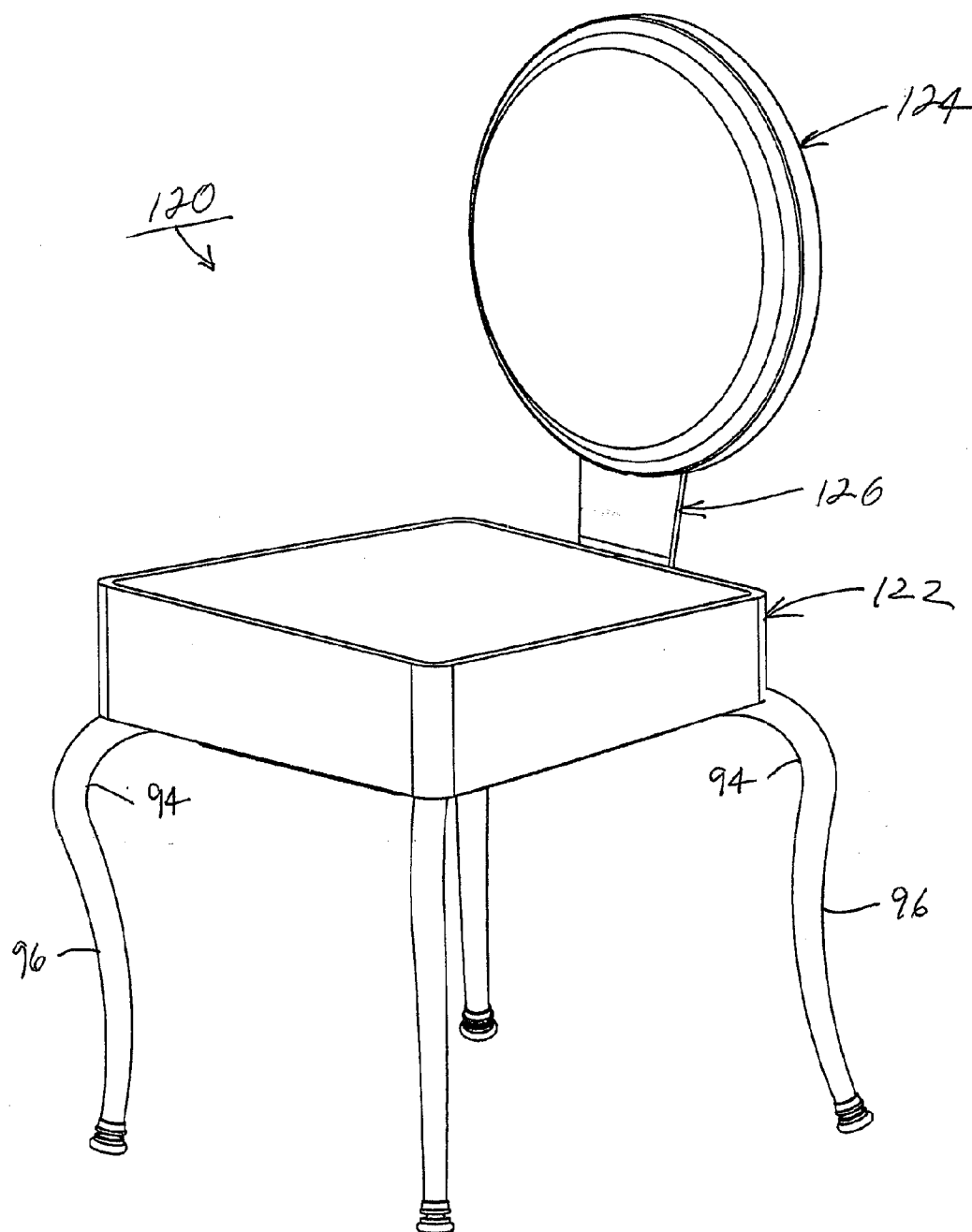


Fig 15

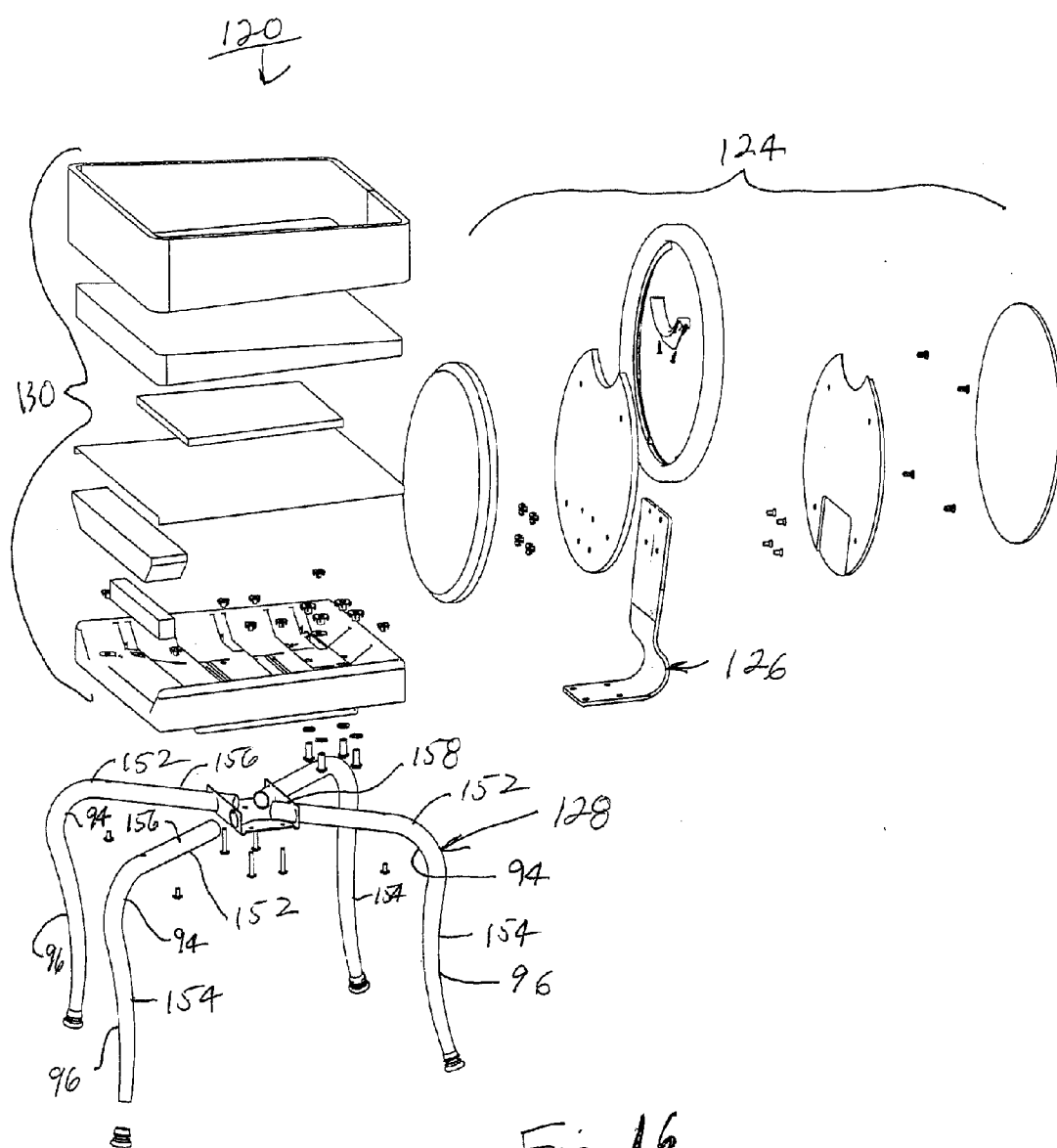
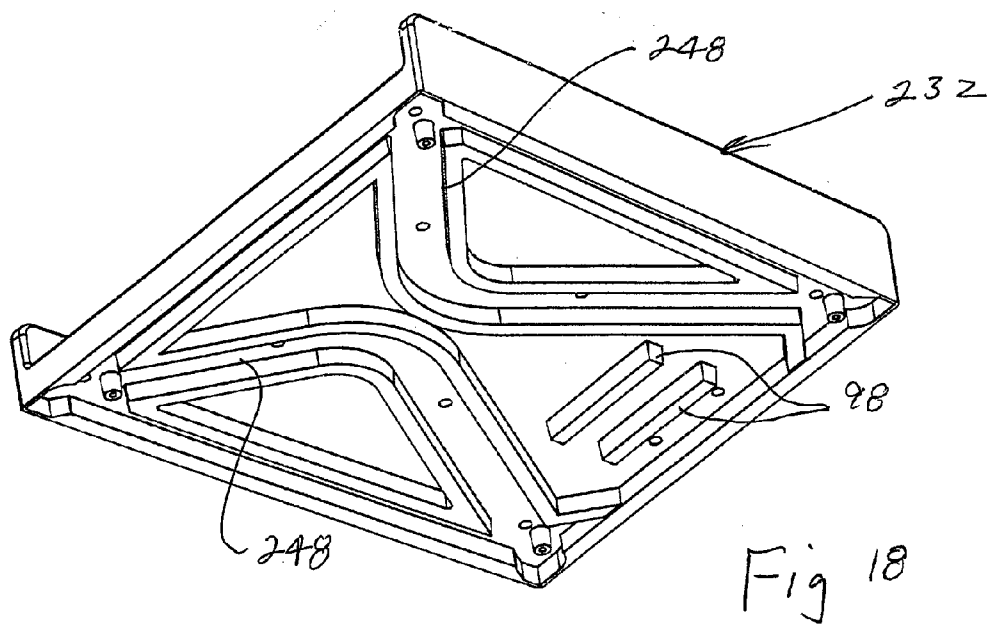
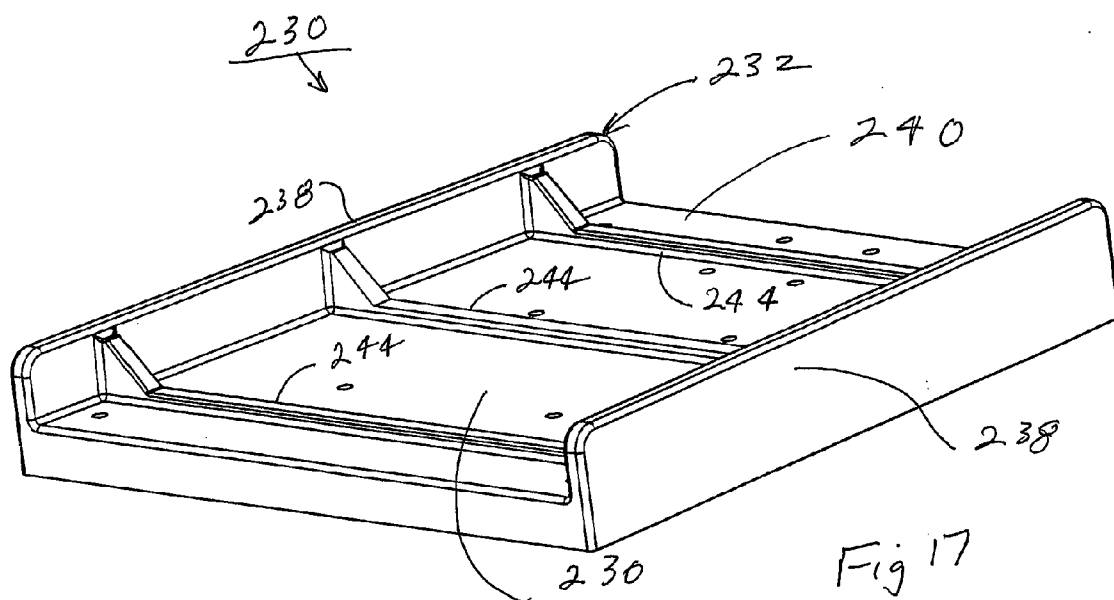


Fig 16



CHAIR

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority from U.S. provisional patent application Ser. No. 61/345,239 filed May 17, 2010, U.S. design patent application Ser. No. 29/361,770 filed May 14, 2010; and U.S. design patent application Ser. No. 29/361,773 filed May 14, 2010, the disclosures of which are hereby incorporated herein by reference in their entirety.

BACKGROUND OF THE INVENTION

[0002] The present invention is directed to a chair, or seating implement, and, in particular, to a chair having a base, a backrest and a back brace supporting the backrest from the base. While the invention is illustrated as a nestable chair, it may find application in chairs that do not nest. While the invention may find application in restaurant and cafeteria seating, it may be used in other applications as well.

[0003] These and other objects, advantages and features of this invention will become apparent upon review of the following specification in conjunction with the drawings.

SUMMARY OF THE INVENTION

[0004] A chair, according to an aspect of the invention, includes a base, a backrest, and a back brace supporting the backrest from the base. The base includes a leg assembly and a seat assembly supported by the leg assembly. The seat assembly includes a pan and a flexible support membrane. The pan has a bottom member and at least one sidewall extending upwardly from the bottom thereby defining an upwardly opening cavity. The flexible support membrane is supported by the sidewall over the cavity in a manner sufficient to support a person substantially with the support membrane.

[0005] The sidewall may surround substantially the sides and back of the pan and may further include a flexible filler member between the support membrane and the bottom. One or more pad members may be supported by the support membrane.

[0006] The pan may be molded as a unitary member. Stiffening ribs may be formed in the bottom member extending to the sidewall. The bottom member may define a generally planar lower surface and at least one channel in the lower surface to receive a horizontal portion of the leg assembly. In this manner, the generally planar lower surface may define a stacking surface for engaging another chair.

[0007] A chair, according to another aspect of the invention, includes a base, a backrest, and a back brace supporting the backrest from the base. The base includes a leg assembly and a seat assembly supported by the leg assembly. The back brace defines a flexible support for the backrest, wherein the backrest is capable of limited motion with respect to the base by flexing of the back brace. The back brace is defined by a generally planar member having one end portion that is configured to attach to the base. An opposite end portion is configured to attach to the backrest. An intermediate portion is formed as a serpentine shape defined by a first curved portion opening toward the base and a second curved portion opening away from the base.

[0008] The second curved portion may be positioned above the first curved portion and further away from the base than the first curved portion. The first curved portion and the

second curved portion may have approximately the same radius of curvature. The radius of curvature may be approximately 1.5 inches. The generally planar member may be tapered from the opposite end portion toward the one end portion.

[0009] A chair, according to another aspect of the invention, includes a base, a backrest, and a back brace supporting the backrest from the base. The base includes a leg assembly and a seat assembly supported by the leg assembly. The backrest includes an outer frame and one or more panels supported within the frame. The outer frame is made from an extruded member having a generally tubular member and a fin coextruded with said generally tubular member. The fin extends inwardly from the tubular member. The panel(s) is fastened to the fin. The fin may have a scalloped shape.

[0010] A chair, according to yet another aspect of the invention, includes a base, a backrest, and a back brace supporting the backrest from the base. The base includes a leg assembly and a seat assembly supported by the leg assembly. The leg assembly is made up of a plurality of leg members. Each of the leg members has a generally vertical portion and a generally horizontal portion. The leg assembly further includes a joiner member that joins the horizontal portions of the leg members.

[0011] End portions of the horizontal portions of the leg members may be welded to the joiner member. The generally vertical portion of the leg members may have a complex shape. The complex shape may be in the form of a swage configuration. The swage configuration may include a rectangular cross section that transforms to a curved cross section. Alternatively, the complex shape may include multiple bends. The multiple bends may face in generally opposite directions.

[0012] These and other objects, advantages and features of this invention will become apparent upon review of the following specification in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] FIG. 1 is a perspective view of a chair, according to an embodiment of the invention;

[0014] FIG. 2 is an exploded perspective view of the chair in FIG. 1;

[0015] FIG. 3 is a side elevation of the chair in FIG. 1;

[0016] FIG. 4 is a bottom plan view of the chair in FIG. 1;

[0017] FIG. 5 is a perspective view of a leg assembly;

[0018] FIG. 6 is a front elevation of a pan;

[0019] FIG. 7 is a perspective view of the pan in FIG. 6 taken from the top, front and side thereof;

[0020] FIG. 8 is a perspective view of the pan in FIG. 6 taken from the bottom, front and side thereof;

[0021] FIG. 9 is a top plan view of the pan in FIG. 6;

[0022] FIG. 10 is a bottom plan view of the pan in FIG. 6;

[0023] FIG. 11 is an enlarged perspective view of the area designated XI in FIG. 2 with the frame cut open to reveal internal details thereof;

[0024] FIG. 12 is a sectional view taken along the lines XII-XII in FIG. 11;

[0025] FIG. 13 is a perspective view of a back brace;

[0026] FIG. 14a is a side elevation of the back brace in FIG. 13;

[0027] FIG. 14b is a rear elevation of the back brace in FIG. 13;

[0028] FIG. 15 is the same view as FIG. 1 of an alternative embodiment of the invention;

[0029] FIG. 16 is an exploded perspective view of the chair in FIG. 15;

[0030] FIG. 17 is the same view as FIG. 7 of an alternative embodiment of a pan; and

[0031] FIG. 18 is the same view as FIG. 8 of the pan in FIG. 17.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0032] Referring now to the drawings and the illustrative embodiments depicted therein, a chair 20 includes a base 22, a backrest 24 and a back brace 26 supporting the backrest from the base (FIGS. 1 and 2). Base 22 is made up of a leg assembly 28 and a seat assembly 30 that is supported by leg assembly 28. Seat assembly 30 is made up of a pan 32 and a flexible support membrane 34 supported by the pan. Pan 32 has a bottom member generally shown at 36 and at least one sidewall 38 extending upwardly from bottom member 36. This defines an upwardly opening cavity 40 surrounded by sidewall 38 and closed at the bottom by bottom member 36. Flexible support membrane 34 is supported by sidewall 38 over cavity 40 in a manner that is sufficient to support a person with support membrane 34. This may be accomplished by tensioning support member 34 over cavity 40 and down the outside of sidewall 38. Such flexible support member 34 is commercially available under the Dymetrol® brand.

[0033] Sidewall 38 surrounds pan 32 on three sides and defines a front opening 41. A flexible filler member, such as a foam pad 42 made from conventional furniture foam, is positioned between support membrane 34 and bottom member 36. Filler member 42 provides support to support member 34 at a front portion of chair 20, but in a manner that is flexible to accommodate the legs of the user. Seat assembly 30 further includes a pad assembly 42 made up of a series of foam pad members 42a, 42b and 42c that are configured to provide cushioning to the user over support membrane 34. Foam pad member 42c surrounds seat assembly 30. It should be understood that chair 20 would be upholstered with suitable fabric and upholstery underlay of the type known in the art.

[0034] In the illustrated embodiment, pan 32 is molded as a unitary member. It may be molded using various techniques known in the art, such as injection molding from a known polymer or compression molding from plastic grind using a known resin. However, other techniques for making pan 32 are intended to be included. A plurality of stiffening ribs 44 may be formed in bottom member 36 spanning opposite side portions of sidewall 38. This adds rigidity to pan 32 to withstand the inward force placed on sidewall 38 from support membrane 34 bearing the weight of the user. However, ribs 44 extend below the upper edges of sidewall 38 to allow support membrane 34 to flex downwardly under the load without contacting the ribs.

[0035] Bottom member 36 defines a generally planar lower surface 46 and one or more channels 48 in lower surface 46 (FIG. 8). Channel(s) 48 are configured to receive a horizontal portion 50 of leg assembly 28. In the illustrated embodiment, channels 48 are configured to receive horizontal portion 50 at or above lower surface 46. In this manner, planar lower surface 46 is the lowest point of seat assembly 30 thereby defining a stacking surface for engaging the seat surface of another chair when chairs 20 are nested on top of one another. This provides stackability to chairs 20 in a manner which reduces wear on the upholstery fabric of the chairs.

[0036] In the illustrated embodiment, leg assembly 28 is made up of a plurality of leg members 52, each of which has a generally vertical portion 54 and a generally horizontal portion 56 (FIG. 5). Horizontal portions 56 of the leg members 52 define the horizontal portion of 50 of the leg assembly, which may further include a joiner member 58 that joins the horizontal portions 56 of the leg members. The horizontal portions 56 of the leg members may be welded or otherwise connected to joiner member 58. This connection may be further assisted by an opening 60 defined in a sidewall 61 for receiving each leg member. This provides additional strength to the leg assembly and removes some of the stress from the weld joint. Channels 48 may be enlarged at a central area 49 that is configured to receive joiner member 58. In this manner, generally all of the horizontal portion 50 of the leg assembly can be at or recessed within pan 32 so that the primary contact with a chair upon which chair 20 is stacked is lower surface 46. Fasteners, such as bolts 59a and engaging nuts 59b, hold leg assembly 28 to the seat assembly.

[0037] An advantage of leg assembly 28 is that leg members 52 can be made in a more complex design because only one vertical portion needs to be formed for each leg member. In the illustrated embodiment, vertical portion 54 is a swage configuration going from a square cross section at the top to a round cross section toward the bottom. Alternatively, the legs could go from a round cross section toward the top to a narrower round cross section toward the bottom, or the like.

[0038] In the illustrated embodiment, back brace 26 provides a flexible support for backrest 24 by allowing limited motion of the backrest with respect to base 22 by flexing of back brace 26. Back brace, or J-bar, 26 is defined by a generally planar member 64, made from aluminum or steel having one end portion 65a that is configured to attach to base 22 and an opposite end portion 65b that is configured to attach to backrest 24 (FIGS. 13, 14a, 14b). Generally, planar member 64 further includes an intermediate portion 66 between end portions 65a, 65b that is formed as a serpentine shape 67. Serpentine shape 67 includes a first curved portion 68 that opens toward base 22 and a second curved portion 70 that opens away from base 22. Second curved portion 70 is above first curved portion 68. First curved portion 68 is curved according to a radius R1 and second curved portion 70 is curved in an opposite direction according to a radius R2. While they could be of different radii, in the illustrated embodiment, first curved portion 68 and said second curved portion 70 have approximately the same radii of curvature. This radius of curvature is approximately 1.5 inches, but could be a greater or lesser amount. Back brace 26 provides flexible support to backrest 24 while withstanding the stress provided by repeated force being placed on the backrest by a user leaning backward without failing. Also, generally planar member 64 is tapered from end portion 65b toward end portion 65a, as best seen in FIG. 14b. Backrest 24 may be made up of an outer frame 72 and a front panel 74 and a rear panel 76 supported within the frame by a series of fasteners, such as self-tapping screws 77. Upholstered covers 78a, 78b may be applied over panels 74, 76 utilizing conventional techniques. A bracket 80 may optionally be provided in order to enclose a hand hold with frame 72 at the top of the chair. Outer frame 72 is made from an extruded member 86 having a generally tubular base 88 and a fin 90 extending from the tubular member. In the illustrated embodiment, tubular member 88 and fin 90 are coextruded, such as from aluminum. Fin 90 extends inwardly from tubular member 88 and forms a fastening

surface. In this manner, fasteners 77 are received in fin 90 to retain panels 74, 76 in position. Fin 90 may have a scalloped shape 92 at least partially as a result of forming of a straight extrusion into at least a partially curved frame. This scalloped shape adds strength to the fin to resist force applied by fasteners 77 penetrating the fin. A slit 75 is formed through a lower portion of outer frame 72 to receive end portion 65b of back brace 26 which is attached to front panel 74, such as with fasteners 81 passing through clearance holes in planar member 64 and engaging threaded fasteners 83. It should be understood that although backrest 24 is illustrated as a circular shape, it could be other shapes, such as rectilinear, shield shape, or the like.

[0039] In an alternative embodiment, a chair 120 includes a base 122, a backrest 124 and a back brace 126 joining backrest 124 to base 122 (FIGS. 15 and 16). Base 122 is made up of a seat assembly 130 that is similar to seat assembly 30 and a leg assembly 128 joined with seat assembly 130. Leg assembly 128 is made up of leg members 152 that are joined with a joiner 158 in the same fashion that leg members 52 are joined with a joiner 58. Leg members 152 have a vertical portion 154 and a horizontal portion 156. Vertical portion 154 is a curved design that has a double bend including an inwardly facing curve 94 and an outwardly facing curve 96. Because leg assembly 128 is made up of separate leg members, each having only one vertical portion, it is possible to manufacture each vertical portion with multiple bends. Other advantages will be apparent to the skilled artisan.

[0040] In another alternative embodiment, a chair (not shown) includes a seat assembly 230 having a pan 232. Pan 232, which may be formed in a similar manner as pan 32, has a bottom member 236 and side walls 238 extending upwardly from the bottom member defining an upward opening cavity 240. Pan 232 further includes a plurality of ribs 244 to give strength to the member to resist the force placed on side walls 238 from a flexible support membrane (not shown) tensioned across cavity 240. Pan 232 further includes a plurality of channels 248, each of which is capable of receiving a half of a leg assembly (not shown) having a horizontal portion and two vertical portions. In this embodiment, pan 232 serves to mechanically combine the half leg assemblies and provide rigidity to the structure. A plurality of offsets 98 provide a mounting surface for a back brace (not shown).

[0041] Changes and modifications in the specifically described embodiments can be carried out without departing from the principles of the invention which is intended to be limited only by the scope of the appended claims, as interpreted according to the principles of patent law including the doctrine of equivalents.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A chair, comprising:

a base, a backrest and a back brace supporting said backrest from said base;

said base comprising a leg assembly and a seat assembly supported by said leg assembly;

said seat assembly comprising a pan and a flexible support membrane, said pan having a bottom member and at least one sidewall extending upwardly from said bottom defining an upwardly opening cavity, said flexible support membrane supported by said at least one sidewall over said cavity in a manner sufficient to support a person substantially with said support membrane.

2. The chair as claimed in claim 1 wherein said at least one sidewall surrounds substantially the sides and back of said pan and further including a flexible filler member between said support membrane and said bottom.

3. The chair as claimed in claim 1 further including at least one pad member supported by said support membrane.

4. The chair as claimed in claim 1 wherein said pan is molded as a unitary member.

5. The chair as claimed in claim 4 including stiffening ribs formed in said bottom member extending to said sidewall.

6. The chair as claimed in claim 4 wherein said bottom member defines a generally planar lower surface and at least one channel in said lower surface, said at least one channel configured to receive a horizontal portion of said leg assembly wherein said generally planar lower surface defines a stacking surface for engaging another chair.

7. The chair as defined in claim 6 wherein said leg assembly comprises a plurality of leg members, each of said leg members having a generally vertical portion and a generally horizontal portion, said horizontal portions of said legs defining said horizontal portion of said leg assembly.

8. The chair as claimed in claim 7 wherein said horizontal portion of said leg assembly further includes a joiner member, said joiner member joining said horizontal portions of said leg members.

9. The chair as claimed in claim 8 wherein end portions of said horizontal portions of said leg members are welded to said joiner member.

10. A chair, comprising:

a base, a backrest and a back brace supporting said backrest from said base;

said base comprising a leg assembly and a seat assembly supported by said leg assembly;

said back brace defining a flexible support for said backrest, wherein said backrest is capable of limited motion with respect to said base by flexing of said back brace, wherein said back brace is defined by a generally planar member having one end portion that is configured to attach to said base, an opposite end portion that is configured to attach to said backrest and an intermediate portion, said intermediate portion formed as a serpentine shape defined by a first curved portion opening toward said base and a second curved portion opening away from said base.

11. The chair as claimed in claim 10 wherein said second curved portion above said first curved portion is further away from said base than said first curved portion.

12. The chair as claimed in claim 10 wherein said first curved portion and said second curved portion have approximately the same radius of curvature.

13. The chair as claimed in claim 12 wherein said radius of curvature is approximately 1.5 inches.

14. The chair as claimed in claim 10 wherein said generally planar member is tapered from said opposite end portion toward said one end portion.

15. A chair, comprising:

a base, a backrest and a back brace supporting said backrest from said base;

said base comprising a leg assembly and a seat assembly supported by said leg assembly;

said backrest comprising an outer frame and at least one panel supported within said frame, said outer frame made from an extruded member having a generally tubular member and a fin coextruded with said generally

tubular member, said fin extending inwardly from said tubular member, wherein said at least one panel is fastened to said fin.

16. The chair as claimed in claim **15** wherein said fin has a scalloped shape.

17. A chair, comprising:

a base, a backrest and a back brace supporting said backrest from said seat;

said base comprising a leg assembly and a seat assembly supported by said leg assembly, wherein said leg assembly comprises a plurality of leg members, each of said leg members having a generally vertical portion and a generally horizontal portion, wherein said leg assembly further includes a joiner member, said joiner member joining said horizontal portions of said leg members.

18. The chair as claimed in claim **17** wherein end portions of said horizontal portions of said leg members are welded to said joiner member.

19. The chair as claimed in claim **17** wherein said generally vertical portion has a complex shape.

20. The chair as claimed in claim **19** wherein said complex shape comprises a swage configuration.

21. The chair as claimed in claim **20** wherein said swage configuration comprises a rectilinear cross section that transforms to a curved cross section.

22. The chair as claimed in claim **19** wherein said complex shape comprises multiple bends.

23. The chair as claimed in claim **22** wherein said multiple bends face in generally opposite directions.

24. A chair, comprising:

a base, a backrest and a back brace supporting said backrest from said base;

said base comprising a leg assembly and a seat assembly supported by said leg assembly;

said seat assembly comprising a pan and a flexible support membrane, said pan having a bottom member and at least one sidewall extending upwardly from said bottom defining an upwardly opening cavity, said flexible support membrane supported by said at least one sidewall over said cavity in a manner sufficient to support a person substantially with said support membrane;

said back brace defining a flexible support for said backrest, wherein said backrest is capable of limited motion with respect to said base by flexing of said back brace, wherein said back brace is defined by a generally planar member having one end portion that is configured to attach to said base, an opposite end portion that is configured to attach to said backrest and an intermediate portion, said intermediate portion formed as a serpentine shape defined by a first curved portion opening toward said base and a second curved portion opening away from said base;

said backrest comprising an outer frame and at least one panel supported within said frame, said outer frame made from an extruded member having a generally tubular member and a fin coextruded with said generally tubular member, said fin extending inwardly from said tubular member, wherein said at least one panel is fastened to said fin; and

said base comprising a leg assembly and a seat assembly supported by said leg assembly, wherein said leg assembly comprises a plurality of leg members, each of said leg members having a generally vertical portion and a generally horizontal portion, wherein said horizontal portion of said leg assembly further includes a joiner member, said joiner member joining said horizontal portions of said leg members.

* * * * *